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SYSTEM AND METHOD FOR INTERFACING BETWEEN SIGNALING  
PROTOCOLS

TECHNICAL FIELD OF THE INVENTION

The present invention relates in general to telecommunication signal processing and more particularly to a system and method for interfacing between signaling protocols.

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SUMMARY OF THE INVENTION

From the foregoing, it may be appreciated by those skilled in the art that a need has arisen for a technique to convert broadband loop emulation services signaling protocols to and from a media gateway and call session control protocol. In accordance with the present invention, a system and method for interfacing between signaling protocols are provided that substantially eliminate or greatly reduce disadvantages and problems associated with conventional telecommunications system operation.

According to an embodiment of the present invention, there is provided a system for interfacing between signaling protocols that includes a Class 5 softswitch operable to generate signaling information in a media gateway and call session control protocol. A gateway is operable to convert the media gateway and call session control protocol to a broadband loop emulation services signaling format.

The present invention provides various technical advantages over conventional telecommunications system operation. For example, one technical advantage is to provide conversion of media gateway and call session control signaling information to and from a broadband loop emulation services signaling format. Another technical advantage is to evolve the public switched telephone network to a packet based broadband distributed network. Other technical advantages may be readily apparent to those skilled in the art from the following figures, description, and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and the advantages thereof, reference is now made to the following description taken in conjunction with the accompanying drawings, wherein like reference numerals represent like parts, in which:

FIGURE 1 illustrates a block diagram of a telecommunications network implementing a signaling interface technique;

FIGURE 2 illustrates a block diagram of a telecommunications network implementing a concentrator technique;

FIGURE 3 illustrates a block diagram of a telecommunications network with both the signaling interface and concentrator techniques.

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DETAILED DESCRIPTION OF THE INVENTION

FIGURE 1 shows a block diagram of a telecommunications network 10 implementing a signaling interface technique. Telecommunications network 10 includes a public switched telephone network (PSTN) 12 and a broadband loop emulation service (BLES) network 14. Conventionally, PSTN 12 couples to BLES network 14 through a Class 5 switch 16 and a gateway 18 in order to provide communications to and from an integrated access device (IAD) 20 at a customer premises 22. Signaling information having one of various broadband loop emulation service signaling protocols, including a channel associated signaling format and a BLES common channel signaling format, is received at gateway 18 from Class 5 switch 16 for transfer to BLES network 14. Channel associated signaling is used to determine such information as ringing, off-hook, and on-hook for a normal plain old telephone service (POTS) telephone. Gateway 18 transfers pulse code modulated voice signals and the signaling information preferably over BLES network 14 using asynchronous transfer mode cells to an appropriate IAD 20.

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*AL* According to the present invention, a signaling network 24 provides signaling information in a network signaling format to a Class 5 softswitch 26. The Class 5 softswitch 26 converts the network signaling format to a media gateway and call session control format. Class 5 softswitch 26 provides the call control, feature activation control, and call accounting intelligence for telecommunications network 10. In the broadband loop emulation services proxy network architecture of telecommunications network 10, Class 5 softswitch 26 is responsible for and has the authority to accept and

control both incoming call requests from the network as well as outgoing call requests from customer premises 22. Class 5 softswitch 26 utilizes network signaling to and from the network and the media gateway and call session control format to and from gateway 18 to establish and teardown subscriber calls and invoke call features on existing calls. Gateway 18 receives the media gateway and call session control format from Class 5 softswitch 26 for processing in order to provide signaling information to the BLES network 14. Examples of media gateway and call session control protocols include Signaling Gateway Control Protocol (SGCP), Media Gateway Control Protocol (MGCP), H.248, H.323, and Signaling Interface Protocol (SIP) signaling standards.

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In operation, Class 5 softswitch 26 receives signaling information in a network signaling format from signaling network 24. Signaling network 24 is shown using an SS7 network signaling format example but may be configured to use any of a variety of signaling protocols to include international signaling configurations such as the C7 signaling protocol and other signaling protocols such as SIP, SIP-T, BICC, and Sigtran. Class 5 softswitch converts the signaling information received in the network signaling format from signaling network 24 to a media gateway and call session control format. The media gateway and call session control format may be any of a variety of such formats including those specified above. The media gateway and call session control format is provided to gateway 18 for conversion to the desired broadband loop emulation service signaling protocol and passed on to IAD 20 at customer premises 22 through BLES network 14.

In order for gateway 18 to support and perform the BLES proxy signaling function, gateway 18 includes additional capabilities over and above those needed for conventional BLES operation. These capabilities include dial tone generation, hook flash detection, frequency shift keying tone detection for caller identification generation, tone detection, digit collection, and call progress tones including re-order tones, busy tones, and fast busy tones. Class 5 softswitch 26, through the signaling information, instructs gateway 18 as to which of the capabilities gateway 18 is to perform.

For reverse operation, signaling information in the broadband loop emulation service signaling format is provided to gateway 18 by IAD 20 at customer premises 22 through BLES network 14. Gateway 18 converts the broadband loop emulation service signaling format to a media gateway and call session control format. Gateway 18 provides signaling information in the media gateway and call session control format to Class 5 softswitch 26. Class 5 softswitch converts the media gateway and call session control format to a network signaling format. Signaling information in the network signaling format is provided for transfer within signaling network 24 by Class 5 softswitch 26. The present invention may accommodate any type of signaling information as alluded to above.

FIGURE 2 shows a block diagram of telecommunications 20 implementing a concentrator technique separate and distinct from the signaling interface of FIGURE 1. Telecommunications network 20 includes PSTN 12, signaling network 24, Class 5 softswitch 26, and gateway 18. Telecommunications network 20 also includes an Internet Protocol (IP) network 30 coupled to various IADs 20 at a

plurality of customer premises 22. Gateway 18 receives pulse code modulated voice signals carried over inter-machine trunks from PSTN 12. Gateway 18 converts the voice signals to Realtime Transport Protocol (RTP) packets for transmission to appropriate IADs 20 over IP network 30. The IADs 20 receive the RTP packets and convert the information carried therein back to voice signals. Gateway 18 receives signaling information in the media gateway and call session control format from Class 5 softswitch 26. The signaling information assist gateway 18 by identifying which trunk provides the voice signals, which IAD 20 to communicate with, and to connect PSTN 12 to IP network 30. Class 5 softswitch 26 also provides signaling information to IADs 20 over IP network 30 to control individual telecommunications equipment coupled to IADs 20 at customer premises 22.

To eliminate a need for a signaling information link from Class 5 softswitch 26 to IADs 20, the signaling information for controlling individual pieces of telecommunications equipment coupled to IADs 20 may be processed through gateway 18. Gateway 18 provides management of signaling information between Class 5 softswitch 26 and IADs 20. Gateway 18 performs translation of the signaling information between Class 5 softswitch 26 and IADs 20. Gateway 18 will provide both the voice encoded RTP packets and the signaling information in the media gateway and call session control format to IADs 20. This technique eliminates the requirement of coupling Class 5 softswitch 26 to IP network 30. Class 5 softswitch 26 no longer needs to keep track of all IADs 20 being communicated with as this function is now off loaded to extended routing capabilities in gateway 18. The RTP packets and the



signaling information are provided on separate logical paths from gateway 18 to IADs 20 and may or may not be provided on the same physical link therebetween. Thus, gateway 18 provides concentration of signaling information with voice encoded packets to destination IADs 20.

Gateway 18 also handles communications from IADs 20 to PSTN 12 and Class 5 softswitch 26. Gateway 18 may receive voice encoded RTP packets and signaling information in the media gateway and call session control format from IADs 20. Gateway 18 converts the RTP packets into voice signals for transfer to PSTN 12 over the inter-machine trunks. Gateway 18 also processes the signaling information for transfer to Class 5 softswitch 26 and ultimately to signaling network 24.

FIGURE 3 shows a block diagram of a telecommunications network 30 incorporating both the signaling interface and concentrator techniques. Gateway 18 can also provide conversion of the broadband loop emulation service signaling protocol to the media gateway and call session control format for transfer of signaling information from Class 5 switch 16 or BLES network 14 to IP network 30. Gateway 18 may also provide the conversion of signaling information from Class 5 switch 16 or BLES network 14 for transfer to Class 5 softswitch 26. Gateway 18 further provides the concentration function discussed above.

The signaling interface and concentrator features provided by gateway 18 discussed above enable service providers to deploy a softswitch architecture together with standards based voice over digital subscriber lines (VoDSL) without requiring the change out of multiple generations of IADs 20. In the first stages of VoDSL

deployment, the installed base of VoDSL IADs 20 primarily support asynchronous transfer mode (ATM) based broadband loop emulation services. In order to deploy VoDSL in a next generation softswitch architecture, IADs 20 must be able to support voice over internet protocol (VoIP), MGCP, h.248/Megaco, SIP, among other new telephone features. This would force service providers to do a complete change out of customer premises hardware, resulting in increased costs and disruption of services. Gateway 18 allows service providers to migrate their existing network to next generation packet technologies. Gateway 18 is able to offer service providers the flexibility to deploy VoDSL in a Class 5 derived architecture, a pure softswitch architecture, or a hybrid architecture regardless of the network topology or standards based protocol enabled in IAD 20.

In summary, gateway 18 offers for example integrated northbound and southbound MGCP, H.248/Megaco, and SIP in combination with the BLES proxy feature that is able to take for example AAL2 BLES from IAD 20 and translate it to MGCP, H.248, and SIP to enable a seamless interface with a softswitch architecture. Along with the concentrator feature, the BLES proxy feature allows service providers to deploy standards based VoDSL immediately without forcing a major upgrade of customer premises equipment to migrate the network for supporting a Class 5 replacement or advanced services provided by a softswitch. The present invention makes different types of customer premises equipment appear uniform to the switching core, enabling service providers to de-couple the core network switching evolution from the access equipment.

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